

Section: Agriculture**Impact of the Development of Bio-Industrial Agricultural Models on Cattle Growth and Environmental on Dry Land in Tabanan Bali****Berlian Natalia, I Gst. Ngr Alit Wiswasta, MP, I Ketut Arnawa, I Putu Sujana**

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Corresponding Author: Berlian Natalia**Received: 2019-01-03; Accepted 2019-01-27,****Abstract:**

The main objectives of this study were (1) to analyze the impact of bioindustrial agriculture development on livestock growth on dry land in Tabanan Bali (2) analyze what factors influence livestock growth in the development of bioindustrial agriculture in Tabanan Bali dry land, (3) analyze the impact the development of bioindustry-based sustainable agriculture on the environment in this case the Carrying Capacity of cattle on dry land in Bali. The study was conducted in Antapan Village with a sample of 45 farmers, data collected by survey techniques using questionnaires. Data were analyzed using descriptive analysis and multiple linear regression. The results of the study found that the impact of the development of bioindustrial farming models could increase cattle weight gain, namely fattening cattle by farmers only averaging 10.5 / kg / month, while cattle fattening on bioindustry farming models was flat average of 18.7 kg / month, the factors that influence the increase in cow weight growth in the bioindustry farming model in Antapan Village are, the amount and type of feed, as well as the amount of labor use, the development of bioindustry farming models have an impact on increasing cattle capacity amounting to 39,6429 head of cattle

Keywords: Dry Land, Cattle, Carrying Capacity, Feed, Bio industry**Introduction:**

Dryland agriculture is agriculture whose land is cultivated without flooding, the main source of water depends on rainfall. Proper dry land processing can prevent and reduce damage and can ensure the sustainability of land and bring great benefits to support livestock business. Livestock is one of the efforts that can be done to help with problems in dry land. This business is often less

productive to produce food and or food sources. The availability of ruminant feed, especially forage in dryland agriculture is strongly influenced by the season, abundant forage rainy season and in the dry season there is a shortage of forages so that the quantity, quality and continuity of forage feed is not guaranteed throughout the year causing livestock to not produce optimally (Ruswendi ,

2004). Semin Subdistrict which is the location of research has the potential to use feed ingredients to be used as ruminant animal feed including forage in the form of grass and agricultural waste. It is not only forage grass and agricultural waste that can be used as feed but also many other forage potentials that are not yet known precisely.

Starting in 2015, the Ministry of Agriculture has designed the implementation of the Bio Industry Agriculture Model (MPBI). Renewal in the perspective of the bioindustry farming system is 1) intensive ecosystem-based agricultural business, namely maximizing income and added value through ecological engineering, through integrated farming patterns between plants, livestock or fish; 2) processing agricultural products to multiply the variety of products and add value to agricultural products and reduce waste; and 3) through the integration of biodigester-biorefinery agriculture with the hope of reducing energy dependence, the use of external inputs, being environmentally friendly, and reducing nutrient leakage from agroecosystems and economies of scale (Simatupang, 2014)

Baturiti District, Tabanan Regency is very appropriate to be used as a bio-industrial agricultural model, because the results of the Participatory Rural Appraisal conducted in 2015 showed that vegetable crops, which are the main commodities cultivated by farmers, are totally dependent on external inputs. The level of input dependence ranges from 67% - 100%. More specifically, the contribution of pesticide costs ranges from 8% -18%, while chemical fertilizers range from 7% - 25%. Cabbage plants are the most dependent plants with chemical fertilizers and pesticides (Yasa et al., 2015). Baturiti Subdistrict is located approximately 30 Km north of Tabanan City, has an area of 99.17 km² with altitudes ranging from 465-2082 from sea level. Based on the AEZ study by BPTP Bali in 2000, it included the category "wetland medium plain dry land. Based on rainfall data from BMKG, from 2009 - 2014, rainfall in Baturiti District tended to decrease. Normal rainfall during the rainy season

ranges between 2,276 - 3,079 mm (Sunarso and Rubiyo, 2004). Rainfall in 2014 was below the standard, because it reached 2,078 mm. So that water is a limiting factor for the continuation of farming.

Baturiti Subdistrict is also one of the fattening cattle centers and based on Bali Governor Regulation No. 9 of 2013, it was established as a central area for horticultural commodities, especially upland vegetables. Cattle fattening farms are community farms that have not paid attention to aspects of seed selection, feed health, housing, and marketing. Likewise, waste from livestock produced (stool and urine) has not been used optimally for vegetable commodities. The business of fattening beef cattle requires feed with sufficient quantity with continuous good quality (Gunawan, et al., 1996). Giving concentrates as reinforcing feed is usually carried out limited by farmers who have a good level of economic ability, consequently the productivity of cattle at rural farmer levels is low, namely the addition of Bali cattle bodies averaging around 280 grams / head / day (Saka, 1990) to 330 gram / head / day (Yasa, et al., 2013)

In an effort to develop livestock, feed is one of the limiting factors that determine the performance of production and reproduction of livestock. The availability of vegetable waste has the potential to be developed into a source of substitute grass feed for business efficiency. On the other hand cow manure generally contains disease seeds and weed seeds, so it is very important to be managed to reduce environmental pollution. Composting or biogas production is an alternative strategy to reduce contamination of disease seedlings and weed seedlings in livestock manure, thereby breaking the cycle of plant diseases and weeds, in addition to producing quality organic fertilizers for vegetable crops or other crops that are cultivated, and biogas as alternative energy to replace fossil energy. In addition, in horticultural commodities, especially vegetable crops, the use of chemical pesticides is generally very massive so it needs to

be developed using environmentally friendly pesticides

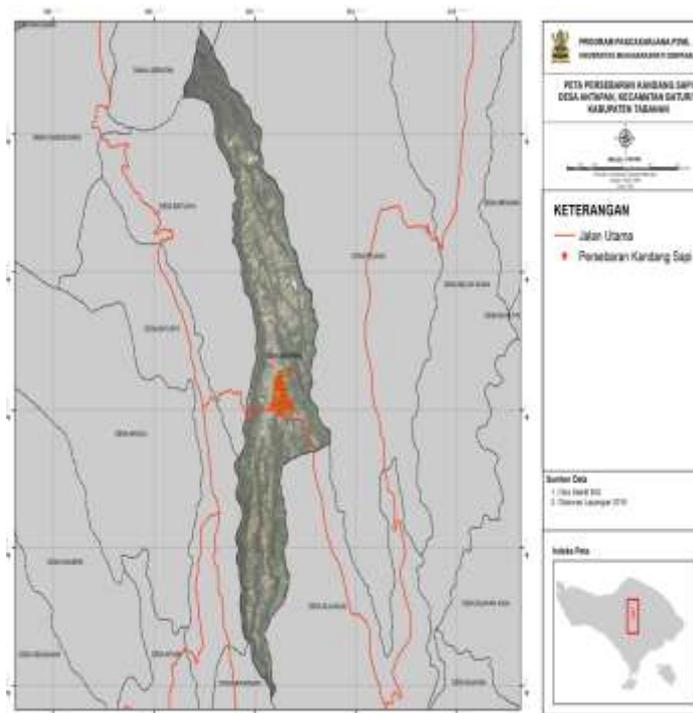
Research Methods:

This research will be carried out as descriptive analytic research, meaning that a description of the facts will be carried out, followed by an analysis of the significance of the emperic facts found. The description and significance analysis includes facts regarding:

- (1) The impact of the development of bioindustry-based sustainable agriculture on livestock growth and health on dry land in Bali,
- (2) What factors influence livestock growth and health in the development of bioindustry-based agriculture on dry land in Bali and
- (3) The impact of the development of bioindustry-based sustainable agriculture on the environment in this case the carrying capacity of cattle on dry land in Bali

Location and Research Samples:

The location of the study was focused on dryland farming which was cultivated with a bioindustry-based sustainable agriculture model, namely in the Antapan Village, Baturiti District, Tabanan Regency. Based on the balance, the research location was determined by purposive sampling, namely in Antapan Village, farmers conducted bioindustry-based farming. Furthermore, physical observations and observations will be made of farming by farmers. The population in this study were farmers who carried out bioindustry based farming in the 2017/2018 planting season. The study sample was determined by census of the 45 farmers who carried out bio-industrial-based ushatani entirely as samples.



Picture 1 Distribution of Cow Cages in Antapan Village

Data analysis:

This research was carried out as analytical descriptive research, meaning that a description of the facts would be carried out, followed by an analysis of the significance of the emperic facts found. The description and significance analysis includes facts about: (1) the impact of the development of bioindustry-based sustainable agriculture on livestock growth on dry land in Tabanan Bali, (2) what factors influence the growth of cow weight in the development of bioindustry based agriculture on dry land in Bali and (3) the impact of the development of bioindustry-based sustainable agriculture on the environment in this case carrying capacity of cattle on dry land in Tabanan Bali.

Factors that affect cow growth:

To find out the factors that influence the growth of cattle, multiple linear analysis of the model "Cobb - Douglaas" is used (Domodar Gujararti, 1993), with the formulation : $Y = \beta_0 X_1^{\beta_1} X_2^{\beta_2} X_3^{\beta_3} X_4^{\beta_4} e^u$ to facilitate the calculation of the above functions can be formulated as follows: $\text{Log } Y = \text{Log } \beta_0 + \beta_1 \text{Log } X_1 + \beta_2 \text{Log } X_2 +$

$\beta_3 \text{ Log } X_3 + \beta_4 \text{ Log } X_4 + e^u$ On is the production elasticity (y) due to changes (factors of production) β_0 intersep, 0 n is the production elasticity (y) due to changes (factors of production) $\beta_0 1 \dots \dots \dots \beta_u$ is a disturbance term, e is a on is the production elasticity (y) due to changes (factors of production) $\beta_0 1 \dots \dots \dots \beta_u$ is a disturbance term, u is a natural logarithm; $e = 2,718$,

Carrying Capacity Analysis:

Taking samples of "samples" The area of each thread is 1 m2 with the distance between the second tile, 10 meters, where the two samples form one "cluster" (Hall et al, (1964); Susetyo et al (1980) in Reksohadiprodjo, (1994), inventorying the types of forage, botanical composition and measurement of pasture production every 1 ha. 3. The vegetation in each sample is cut, weighed, after which it is identified and reconsider the types of forages that exist separately according to the grass group , leguminose and weeds (weeds), 4. knowing the composition of forage botanicals, knowing the potential forage of feed based on the results of the samples obtained, knowing the calculation of Capacity based on fresh forage production from regional potential and the number of livestock.

Results and Discussion:

Growth of cattle in dry land in Tabanan Bali

To find out the agricultural impact of the bioindustrial model on cattle growth was carried out by comparing the growth of cattle carried out by farmers with the growth of bioindustry farming cattle models, for this reason treatment was made using 15 Bali cattle with a weight of 200-300 kg as a treatment; so that the number of cows used is 30. Fattening is carried out for 5-6 months. The treatments given are: P1, Treatment of cattle fattening, such as existing farmers, not given worms, given SE vaccines, basic feed is only forage (HMT), not given reinforced feed, not given growth boosters, not given probiotics Bio Cas , not given vitamins or minerals, and not given salt. Whereas the cattle fattening bioindustrial model P2: given worm medicine, SE vaccine, HMT basic

feed, polar reinforcing feed 1 kg / head / day, booster grows 1 ml / 90 kg body weight, every 28 days, probiotics 5 ml / head / day , mineral vitamins 1 tablespoon / day. The results of the study are presented in Table 1

Table 1. Cattle weight gain. on bioindustry model agriculture in Antapan Village in 2018

No	Observation	Additional cow weight (Kg)	
		Farmer's way	Bioindustry model
1	Month I	212.6	242.8
2	Month II	225.4	266.3
3	Month III	237.4	289.1
4	Month IV	250.4	310.9
5	Month V	263.0	331.2
6	Month VI	275.6	355.2

Source: Analysis of primary data

Based on Table 1 and Figure 2, it can be seen that the bioindustrial model of cow's weight gain material is higher, compared to the method of fattening cattle by farmers. If calculated by the average weight gain of cattle per month, fattening cattle by farmers is only 10.5 / kg / month, while fattening cattle in the bioindustry farming model averages 18.7 kg / month. When viewed from the treatment, the administration of worm medicine will function to increase cow weight gain, because deworming in cattle is a problem that is quite serious for farmers, if not handled seriously. Giving cow deworming medicine is one thing that must be done by cattle farmers who still lack knowledge about the disease in cattle. Worms or commonly called worm disease is a disease caused by worms, where the worms live in the body of the host and suck the essence of food, the worms usually live in the digestive tract and liver, so that the cow's weight gain will be relatively low and the cow will appear thin. In the field of cattle farming, intestinal worms often occur in Ruminant animals. In general, intestinal worms do not directly cause death in livestock, but from an economic point of view this disease has a considerable impact

because this can cause a decrease in meat, milk and productivity in livestock.

There are several types of worms that can infect and are parasitic in cattle, morphologically can be divided into 3 types, namely trematodes, castoda and nematodes. All worms that are included in the type of trematodes are parasitic in cattle, these worms are flat and have an acetabulum which functions to attach to the host's digestive system.

The provision of reinforcing feed, concentrate (polard) is also one of the causes of increased weight of fattening cattle in the bioindustrial model, when compared to fattening beef cattle by farmers. Concentrate is used in cattle with the aim of increasing low cow nutrition so that the normal needs needed for cattle are met to support the growth of cattle. Addition of concentrates to cattle feed also has a goal that is no less important, namely to meet the need for essential nutritional nutrients from food, so that large production can be obtained from cattle. In addition, with the use of concentrates intended to improve the digestibility of dry feed, fattening cattle to efficiency in the use of basic feed.

Giving the concentrate as a nutrient enhancer is very good to use because it can also improve the digestion of poor cattle. Because concentrates are made from a variety of mixtures of feed ingredients that contain a lot of protein, calcium, carbohydrates and others. Concentrates have a variety of sources depending on the type. For example, such as concentrate as an energy source because of its low protein content but higher carbohydrate content, while for concentrates to increase protein, the protein content contained in concentrates is higher and the carbohydrate content is lower.

Giving concentrates between ruminants and non-ruminants is different. If in ruminant animals the concentrate is given at the time before giving basic or rough food such as grass on livestock, but non-ruminant livestock or poultry is given after being given basic food. This can be intended so that the microbes contained in the rumen of ruminant

animals multiply first so that after the process of feeding the staple feed it will be more easily digested perfectly.

Whereas in poultry or non-ruminant feed, concentrated feed is given after basic feeding and in general it is given at the age of one to seven days for rapid and optimal growth. Concentrate feed is indeed very necessary in addition to providing basic feed in the form of leaf or grass because concentrated feed is intended to improve the nutrition of livestock so that it will help the process of growing livestock. It is recommended to provide concentrated feed with a more frequent time to maintain the physical resistance of the farm animals themselves.

Industrial model weight gain of fattening cattle is higher than that of fattening cattle by farmers can also be caused by the provision of probiotics. Probiotics are supplements in the form of live microorganisms that can increase body weight, efficient ration, and health of cattle. This is reinforced by the research of Muhammad Winugroho, (2019), found that the administration of bioplus probiotics can increase body weight and calf health. Therefore to increase weight gain fattening cows can be given probiotics.

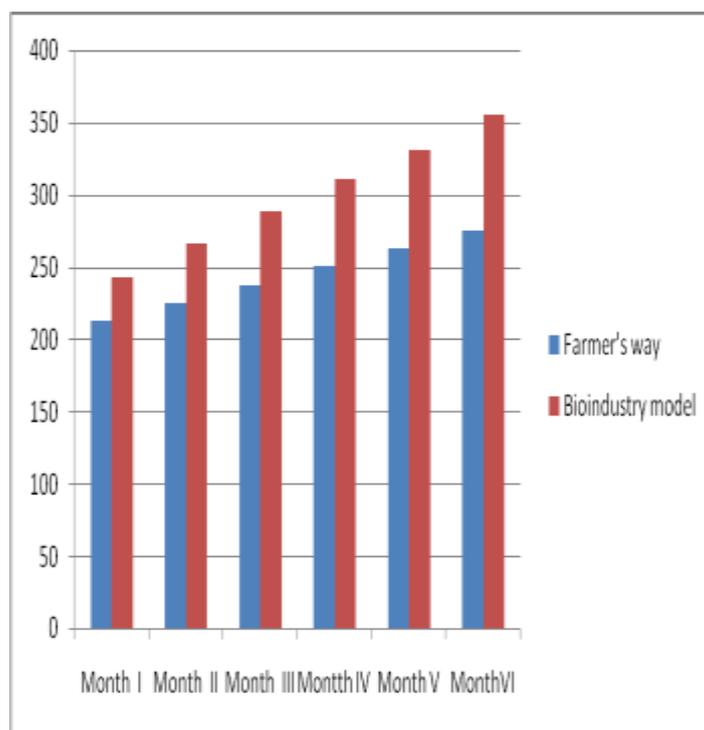


Figure 2 Additional cow weight

Factors that influence the growth of cattle

To obtain factors that affect the weight of a cow. (Y) specified as a function of the age of cattle (X1), type of feed (X2), drugs (X3), labor (X4), estimation results obtained Fcount 27,703 significantly different from the real level of 1 percent. The coefficient of determination of R-squared 0.735 means that 73.50 percent of the growth of cattle weight can be explained by the model built, and the remaining 26.5 is explained by other variables not in the model.

Table 2. Factors that influence the growth of cattle weight in the bioindustry farming model in Antapan Village

Variable	Coefficient	Prob (t-statistic)
Constants	0.276	0.000
Age of cow Log X ₁	-0.066	0.435 (-0.789)
Type of feed Log X ₂	0.425	0.000 (6.409)***
Number of drug Log X ₃	0.034	0.658 (0.447)
Amount of labor Log X ₄	0.202	0.000 (3.817)***
R-squared 0,735 Adjusted R-squared 0,708 F-statistic 27,703 Prob(F-statistic) 0,000		

Description: Numbers in parentheses are t-count
*** = significantly different at 1% significance level

The growth of cattle weight in the bioindustry farming model is influenced, the age of the cow, the provision of types of feed, the provision of medicines, and the amount of labor use. Cow age (Log X1) has no significant effect on cow body weight growth, probability value (t-statistic) 0.435 is greater than 0.0500, meaning the age of cow does not significantly affect the significance level of 5% (0.0500) to farm value added, this is due to the age of the cows being fattened does not vary,

that is, the average age is 1.5 years, but there is a tendency for older cows, the smaller the weight growth, this can be seen from the negative coefficient - 0.066 although not significantly different.

The number of types of feed (Log X2) has a significant effect on the growth of cow weight, the probability value (t-statistic) 0,000 is smaller than 0.01, meaning that the type of feed has a significant effect on the significance level of 1% (0.0100) on the growth of cattle weight. With a regression coefficient of 0.425, it means that if the amount of feed is increased by 1%, the growth of cattle weight will increase by 0.425%. This also means to increase the growth of cattle weight, the amount of feed must be increased, with the type of cattle feed in the form of concentrates and the type of forage is odot grass.

Drugs (LogX3) have no significant effect on the growth of cow weight. The probability value (t-statistic) of 0.658 is greater than 0.0500, meaning that the administration of drugs has no effect on the significance level of 5% (0.0500) on the growth of cow weight. This may be due to almost no cows being attacked during the study. However, there is a tendency, if the amount of medicine increases, then the increase in cow's weight growth also increases, this can be seen from the positive regression coefficient of 0.034, although not significantly different

The amount of labor (X4) has a very significant effect on the growth of cow weight. The probability value (t-statistic) 0,000 is smaller than 0.0100, meaning that the number of workers has a significant effect on the significance level of 1% (0.0100). The coefficient of 0.202 means that if the amount of work is increased by 1%, the increase in cow weight increases by 0.202%. This means that the more amount of labor that is used means there is a tendency for the higher growth of body weight. It can also be explained that the more intensive cattle maintenance is carried out, the more labor needed, the results of the study found that the development of bioindustry farming models has opened up more employment opportunities,

especially for processing solid livestock waste in the form of stool into organic fertilizer and liquid waste in the form of urine into biourine. Therefore, the development of a bioindustry farming model needs to be continuously developed.

The impact of the development of bioindustry-based agriculture on Carrying capacity

Carrying Capacity (CC) is the ability to accommodate livestock per unit per unit area so as to provide optimum results or capacity for an area to meet the forage feed requirements calculated in animal units (AU). Livestock density that does not pay attention to the Carring Capacity will hinder the growth of preferred forage, so that the forage population that produces well will decrease its production capacity, because it does not have the opportunity to grow back therefore the supply to support livestock management can be obtained mostly from crop residues (Luthan, 2010).

The calculation of the carrying capacity of a land on the number of livestock kept is based on the production of available forage food. In this calculation the norms of Livestock Unit are used, which is a measure used to link livestock body weight with the amount of livestock food consumed. Norm / standard forage requirements for livestock based on Livestock Unit.

Table 3 The amount of forage in cattle in the bioindustry farming model in Antapan Village in 2018

No	Forage type / Capacity	Amount (Kg/day)
1	Odot grass	787.50 (Kg/day)
2	Planting waste	600.00 (Kg/day)
	Total forage	1,387.50 (Kg/day)
	Carrying capacity	39.6429 cow's

Source: Analysis of primary data

Pointing to Table 3, the amount of odot grass is calculated by making 10 m x 10 m of cassava obtained by the weight of dry grass odot as much

as 25.5 kg / 1 m² or per hectare of 2250 kg / ha. The results of the study found that the odot grass was harvested every 40 days, so that the production of odot grass was obtained at 56.25 kg / day / ha. The amount of odot grass that is produced, if the planting of odot grass is only planted in the embankment, then the number of embankments is assumed to be 20% of the entire agricultural area in Antapan Village, which is 70 hectares, then the extent of odot grass planting is 14 hectares. So that the odot grass production in Antapan Village is 787.5 kg / ha / day. Odot grass (dwarf napier / elephant cebo 1) has a protein content of 11% higher than elephant mput which only ranges from 6-8%. In cultivating it very easily and excellence, the distance of sections is 1-4 c m, the height is 40-75 c m, I have soft stem. Therefore increasing the capacity of livestock should farmers plant odot grass.

Furthermore, forage from plant residues accounted for 25% of vegetable crop production and horticulture, the results of the study found as much as 4 tons / day, so that the forage from plant waste was obtained by 600 kg / day. And before the bioindustry farming model was applied, taidak farmers dared to give the rest of the crop as cattle feed, because farmers had bad experience after being fed from the rest of the plant, many dead cattle farmers, and after the bioindustry model of farming was applied, the remaining plants were given as feed and none dead cow. So that the total amount of green grass from the Odot grass and the remaining plants is obtained by 1387.5 kg / day. According to Luthan, (2010) Adult animals (1 ST) need forage feed as much as 35 kg / head / day. So that the capacity of cattle in Antapan Village is obtained as much as 39,6429, this means that the bioindustrial farming model has an impact on increasing the capacity of livestock by 39,6429 cows.

Conclusion:

Based on the results of the research and discussion it can be concluded as follows:

- 1) The impact of the development of the bio industry farming model can increase cattle

weight gain, namely cattle fattening by farmers is only an average of 10.5 / kg / month, while cattle fattening on bioindustry farming models averages 18.7 kg / month

- 2) The factors that influence the increase in cow body weight growth in the bioindustry farming model in Antapan Village are, the number and type of feed, and the amount of labor use.
- 3) On the development of the bioindustry farming model, it has an impact on the increase in carrying capacity by 39,6429 cows

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